Cool Roofs:

■ Urban Heat Islands/Green Space/Green Roofs

The future for Indiana roofs is looking lighter and brighter. Green roofs, rooftop gardens, and lighter colored roofs are becoming more common as cities look for ways to cool off. Roofs are playing a major role in the reach for lower temperatures this summer.

Urban temperatures average at least 6°F warmer than adjacent rural areas. Pavement, rooftops, and other dark surfaces absorb and radiate heat, causing temperatures to soar. This effect is called the *urban heat island effect*. Dark rooftops also cost home and building owners more money because it takes more energy to cool those buildings. Increased temperatures are also harmful to air quality because more smog is produced. For more information on urban heat island effects, visit http://www.energystar.gov/, http://www.northstarcsi.com/, and http://eetd.lbl.gov/heatisland.

One way to combat heat and improve air quality at the same time is to install a green roof or rooftop garden. A green roof is designed to provide green space on top of a building or structure. Most roofs are suitable for some type of green roof or rooftop garden. Europe has been using green roofs for over 25 years. Canada has been using green roofs for many years as well. Green roofs differ according to the type of vegetation used due to climate and the extent that the roof can be covered with vegetation. For more information on green roofs, visit http://www.peck.ca/ and http://www.zinco.de/ehome.htm.

Several cities, including Chicago and Portland, as part of the Urban Heat Island Pilot Program, have begun to install green roofs on city buildings and offer incentives to homeowners and builders who use green roofs. Of particular interest to Indiana is Chicago's efforts in using green roofs. The Chicago Department of Environment is testing different types of vegetation as it tests the benefits of green roofs. The biggest laboratory is the roof top garden on Chicago City Hall. The 20,300 square foot rooftop garden has 20,000 plants of more than 150 varieties. Most plants are native to the region. The city of Chicago is working with scientists from U.S. EPA and Lawrence Berkeley national laboratory to analyze the effects of this rooftop garden. This research will benefit Indiana in helping to determine what vegetation would work best for green roofs in Indiana and other Midwestern states. More information on Chicago's rooftop gardens can be found at http://www.ci.chi.il.us/Environment/html/RooftopGarden.html.

A similar idea to green roofs is to save greenspace by building more structures underground. An example of this is a completely underground parking garage near the Downtown Indianapolis Westin hotel. At ground level, there is Capitol Commons, a park over the parking garage. So the underground parking garage has a green roof or roof top garden, too. Another nearby example is the footbridge across

This park in downtown Indianapolis is really a green roof. It hides a parking garage underneath. Many people take advantage of this tranquil spot during the lunch hour.

White River leading to the Indianapolis Zoo. Suspended above the river are patches of grass and garden space, providing the cooling effects of a green roof, as well as providing a pleasant setting for an otherwise unadorned space.

Another way to cool temperatures is through the use of lighter colored roofs. Dark surfaces in the sun can become up to 70°F hotter than the reflective white surfaces. The Heat Island Group has monitored buildings in Sacramento with lighter colored, more reflective roofs. They found that the lighter colored roof buildings used up to 40% less energy for cooling than darker roof buildings. The Florida Solar Energy Center performed a similar study with similar results. For more information on this study, visit http://eetd.lbl.gov/HeatIsland/CoolRoofs/.

There are two major ways to make roofs lighter colored: Use naturally lighter and more reflective roofing material or cover a roof with a reflective coating. Coatings are especially popular because so many existing roofs are dark. Contractors nationwide, including contractors in Indiana, have begun to use lighter colored roofs and reflective coatings for some of their homeowner and building customers. So when looking up at your roof, remember to lighten up.